

## CERTIFICATION OF FACSIMILE TRANSMISSION:

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING  
FACSIMILE TRANSMITTED TO THE USPTO ON THE DATE SHOWN  
BELOW:

Date of Transmission: April 12, 2002

Name of Person

Making Transmission: Linda L. Gray

Signature:

*Linda L. Gray 04/12/02***IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**In Re Application of

April 12, 2002

BRUCE J. CHAMBERLIN, ET AL.

Group Art No.: 2827

Serial No. 09/852,998

Examiner: Quynh-Nhu H. Vu

Filed: May 10, 2001

IBM Corporation

Bldg. 300, Zip 482

Title: LAND GRID ARRAY (LGA) PAD  
REPAIR STRUCTURE AND  
METHOD

2070 Route 52

Hopewell Junction, New York 12533

**AMENDMENT**

FAX COPY RECEIVED

Assistant Commissioner for Patents  
Washington, D.C. 20231

APR 12 2002

TECHNOLOGY CENTER 2800

Sir:

In response to the Office Action dated January 16, 2002, the following Amendment is being submitted to place the above identified application in prima facie condition for allowance. Please amend the Application as follows:

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**IN THE CLAIMS:**

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**Please amend claims 10, 11, 12, 13, 14 and 16 as follows:**

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- W1
10. (Amended) An integral replacement pad/trace structure for repair or modification of a printed circuit board comprising:
- a first end having shape and dimensions to serve as a replacement contact pad for a predetermined contact pad to be replaced on a printed circuit board ;
  - a second end having shape and dimensions predetermined to connect to a desired electrical contact on a printed circuit board; and
  - a trace portion integral with and connecting said first and second ends and having shape and dimensions predetermined to interface to the circuit geometry of the printed circuit board between the predetermined replaced contact pad and predetermined electrical contact, wherein said integral replacement pad/trace structure comprises an electrically conductive material.
11. (Amended) The replacement structure of claim 10, wherein said integral replacement pad/trace structure comprises copper foil.
12. (Amended) The replacement structure of claim 10, wherein at least a portion of a bottom surface of said integral replacement pad/trace structure is coated with a heat activated adhesive.

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*Amended*  
13. (Amended) The replacement structure of claim 10, wherein at least a portion of said integral replacement pad/trace structure is plated with gold.

14. (Amended) The replacement structure of claim 13, wherein said portion plated with gold is confined to said first end.

*ar*  
16. (Amended) The replacement structure of claim 10, further comprising an outer insulating layer on at least a portion of said trace portion.

**Please cancel claim 19. Please add new claims 20, 21, 22 and 23 as follows:**

*ab*  
20. (New) A printed circuit board repair structure comprising:  
a printed circuit board having at least one layer;  
at least one electrical contact pad on a first surface of said printed circuit board;  
at least one conductive through hole electrically connecting said at least one electrical contact pad to one of at least one electrical connection on a second surface of said printed circuit board or said at least one layer of said printed circuit board; and  
at least one integral replacement pad/trace structure having a first end replacing said at least one electrical contact pad, a second end electrically connected to said at least one electrical connection, and a trace portion connecting said first and second end, wherein said at least one integral replacement pad/trace structure comprises an electrically conductive material thereby providing a replacement electrical connection on said printed circuit board.

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- a3 encl*
21. (New) The printed circuit board repair structure of claim 20 further comprising:  
at least one replacement repair hole having a diameter sufficient to sever all internal connections of said at least one conductive through hole that said at least one replacement repair hole replaces; and  
wherein at least a portion of said at least one integral replacement pad/trace structure passes through at least a portion of said at least one replacement repair hole thereby providing a replacement electrical connection on said printed circuit board.
22. (New) The printed circuit board repair structure of claim 21 wherein said at least one replacement repair hole further comprises an insulating material surrounding the side walls of said at least one replacement repair hole forming a second smaller diameter providing electrical insulation for said at least one integral replacement pad/trace structure.
23. (New) The printed circuit board repair structure of claim 20 further comprising:  
at least one electrical connection on a second surface of said printed circuit board;  
the at least one integral replacement pad/trace structure having at least one end connected to said at least one electrical connection on a second surface; and  
a custom fabricated insulator having at least one clearance channel to provide clearance around said at least one integral replacement pad/trace structure.
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### **REMARKS**

This application has been reviewed in light of the Office Action dated January 16, 2002. Claims 10 - 18 and 20 - 23 are now presented for examination. Claims 1 to 9 have been withdrawn from consideration pursuant to a restriction requirement. Claim 19 has been canceled. Claims 10 - 14 and 16 have been amended and claims 20 - 23 have been added to more particularly and distinctly claim what the applicants regard as their invention. Support for these amendments is detailed in the remarks that follow and no new matter has been added.

Claims 10 and 20 are independent claims.

Favorable review is respectfully requested.

#### **Election/Restrictions:**

Applicants affirm the provisional election made on 12/20/01 to prosecute the invention of Group II, claims 10 - 19. Claims 1 - 9 have been withdrawn from further consideration by the Examiner as being drawn to a non-elected invention.

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**Objection to the Specification:**

The specification has been objected to by the Examiner as failing to provide proper antecedent basis for the claimed subject matter. The Examiner has stated that the specification does not disclose the feature: "a diameter sufficient to electrically isolate a corresponding one of the contact pads from said connected electronic component or structure", as recited in claim 19.

Claim 19 has been canceled thereby rendering the objection to the specification moot.

**The §112 rejection:**

Claims 10 - 19 have been rejected by the Examiner under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner has stated that claim 10 is confusing and has requested clarification.

Claim 10 has been amended to more particularly describe the replacement pad/trace as an integral structure having a first end and a second end and a trace portion connecting the first and second ends and having a shape and dimensions predetermined to interface to the circuit geometry of the printed circuit board. Support for this amendment is found at least on page 4, lines 11 - 16 and page, 8 lines 17 - 19. Accordingly, no new matter has been added.

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The specific clarification requested by the Examiner is that the "first contact pad portion" and "a second trace portion" as originally described, is one continuous structure. The replacement pad/trace integral structure is not connected to a second trace on the printed circuit board.

It is applicants' belief that claim 10, as amended, is now definite and in conformance with the requirements of 35 U.S.C. §112, second paragraph. Since claims 11 - 18 depend, either directly or indirectly, from claim 10, and since claim 10 is believed to be definite, then claims 11 - 18 are believed to be definite as well. Claim 19 has been canceled rendering the rejection of this claim moot.

The §102 rejection:

Claims 10 and 16 - 18 have been rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by Fillion et al. U.S. Pat. No. 6,239,482.

Claim 10 has been amended to more particularly describe the replacement pad/trace as an integral structure having a first end and a second end and a trace portion connecting the first and second ends and having a shape and dimensions predetermined to interface to the circuit geometry of the printed circuit board. As previously mentioned, support for this amendment is found at least on page 4, lines 11 - 16 and page, 8 lines 17 - 19. Accordingly, no new matter has been added. This integral structure (comprising first end, second end and

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trace portion) would be placed into position as an entire unit wherever needed for repair or modification of a printed circuit board.

Fillion is understood to disclose a polymer film structure for connecting integrated circuits. The circuit pad (224) and trace (324) in the reference are discrete elements and not part of an integral structure. In addition, the circuit pad and trace in the reference are a permanent assembly in the structure and cannot be applied for use as a repair or modification structure. Accordingly, the reference does not teach or suggest the features recited in Applicants' amended claim 10. Since claims 16 - 18 depend, directly or indirectly, from claim 10, and since claim 10 is believed to be allowable, then claims 16 - 18 are believed to be allowable as well.

Claim 10 has been rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by Arndt et al. U.S. Pat. No. 6,232,564.

Arndt discloses a printed circuit board designed with increased channel width for enhanced wireability. The pads (25-28) and electrical connectors (44, 46) are permanent parts of the original build of the circuit board. The reference is not addressed to replacement or repair and does not teach or suggest the use of an integral structure for repair or modification of a printed circuit board. Accordingly, the reference does not teach or suggest the features recited in Applicants' amended claim 10.



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**The §103 rejection:**

Claim 11 has been rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over Fillion et al. U.S. Pat. No. 6,239,482 or Arndt et al. U.S. Pat. No. 6,232,564. Claim 12 has been rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over Fillion et al. U.S. Pat. No. 6,239,482 and Arndt et al. U.S. Pat. No. 6,232,564 in view of Takeda U.S. Pat. No. 6,014,318. Claims 13 - 15 have been rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over Fillion et al. U.S. Pat. No. 6,239,482 and Arndt et al. U.S. Pat. No. 6,232,564 in view of Hashimoto et al. U.S. Pat. No. 6,225,569.

It should be noted that Arndt et al. is not available as prior art under 35 USC §103(c) as both Arndt et al. and the present invention were commonly assigned at the time the present invention was made.

Inasmuch as claims 11 to 15 depend from claim 10, and claim 10 is believed to be allowable then claims 11 to 15 should be allowable as well.

Claim 19 has been rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over Fasano et al. U.S. Pat. No. 5,940,966.

Claim 19 has been canceled thereby rendering the rejection of this claim moot.

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Claims 20 to 23, added in place of claim 19, claim inter alia the integral replacement pad/structure which is not shown or suggested by Fasano et al.

Summary:

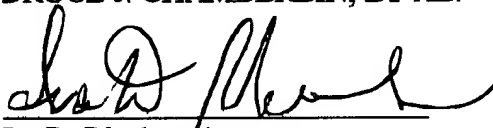
In view of all the preceding remarks, it is respectfully requested that any objections or rejections to this application be reconsidered and withdrawn. Further action with respect to the present application is earnestly solicited. If the Examiner finds this application is deficient in any respect, the Examiner is invited to contact the undersigned at the Examiner's earliest possible convenience.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. This appendix is captioned "Version With Markings to Show Changes Made".

For the foregoing reasons, allowance of the claims is respectfully solicited.

Respectfully submitted,  
BRUCE J. CHAMBERLIN, ET AL.

By:

  
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JJC/lfg

Attachment: Appendix - Version with Markings to Show Changes Made